



Patent
Office



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

REC'D 19 NOV 1999	
WIPO	PCT

GB99 / 3580

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

**PRIORITY
DOCUMENT**

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

Signed

Andrew Gentry

Dated 8 November 1999

02NOV98 E4016A7-1 002916
F01/7700 0.00 - 9823885.0

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

23259.GB/ICB

2. Patent application number

(The Patent Office will fill in this part)

9823885.0

3. Full name, address and postcode of the or of each applicant (underline all surnames)

AQUACAL LIMITED
STRAND FARM
CURRABINNY
CARRIGALINE
CO. CORK
IRELAND



Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

07214927001

4. Title of the invention

FOODSTUFF COMPOSITIONS

5. Name of your agent (if you have one)

LANGNER PARRY

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

**52-54 HIGH HOLBORN
LONDON
WC1V 6RR**

Patents ADP number (if you know it)

1032001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

a) any applicant named in part 3 is not an inventor, or

b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

See note (d))

9. Enter the number of sheets: any of the
following items you are filing with this form.
Do not count copies of the same document

Continuation sheets of this form

Description 12

Claim(s)

Abstract

Drawing(s)

10. If you are also filing any of the following,
state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right
to grant of a patent (*Patents Form 7/77*) One

Request for preliminary examination
and search (*Patents Form 9/77*)

Request for substantive examination
(*Patents Form 10/77*)

Any other documents
(*please specify*)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Langner Parry

Date 30 OCTOBER 1998

LANGNER PARRY

12. Name and daytime telephone number of
person to contact in the United Kingdom

IAIN C. BAILLIE 0171-242-5566

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

FOODSTUFF COMPOSITIONS

5 This invention relates to foodstuff compositions particularly foodstuff compositions containing calcium materials.

10 The fortification of foodstuffs with calcium compounds is well recognised as a means of supplementing calcium in the diet. However, the addition of presently available sources of calcium has been found to result in deterioration in the physical properties of the product to which calcium is added when added in the amounts sufficient to give the desired available calcium so as to ensure an adequate intake of calcium in the diet.

15

In International Patent Application no. PCT/GB98/00142 published as WO/98/33508 there is disclosed the use of a very pure form of corallinaceae for treatment of conditions created by failure of immuno regulation in the body. This has included the use of corallinaceae for the manufacture of a medicament for the treatment of reduced calcium levels and use in manufacturing medicament for raising pH levels in the colon. This application discloses forming emulsions in the manufacture of foods wherein an emulsifier is combined with a residue of a very pure form of corallinaceae (Maërl) and then with an oil phase of a foodstuff which is formed into an emulsion with an aqueous phase. There is reference to the use of these oil products in bakery products. However, this specification does not indicate generally the value of this particular material in relation to starch products particularly farinaceous products.

35 It has now been found that if a very pure form of corallinaceae is employed in the manufacture of starch products particularly farinaceous products much superior

results are obtained in the texture of the resulting product. In particular it is possible to add higher amounts of calcium than is possible with other sources of calcium.

5

The calcareous material used in the invention provides calcium in carbonate form. It contains 34% by weight calcium as compared to 40% by weight for conventional commercial calcium carbonate.

10

By adding the calcareous material according to the invention it is possible to achieve a known RDI (Recommended Dietary Intake) for a specified weight or volume of foodstuff without affecting the qualities of the product, for example texture, mouth-feel, strength and cooking properties.

15

The calcareous material used in the invention is more fully described in the above international patent application. The calcareous material is obtained from corallinaceae.

20

Corallinaceae, for example Lithothamnium corallioides, are known seaweeds which are very abundant in certain cold and temperate seas. Once harvested the crude residual product consists primarily of mineral substances, particularly calcium carbonate and magnesium carbonate. The largest component is calcium carbonate, often about 34% by weight. This product is sometimes identified as Maërl though the term Maërl encompasses residues of coralline algae of various members of the order corallinales (Class Rhodophyceae) including members of corallinaceae for example members of the species Lithothamnium corallioides, Phymatolithon calcareum and Lithothamnium glaciale.

30

35

Crude corallinaceae (Lithothamnium corallioides)

residues have been commercially available for use in the prevention of acidosis in intensively fed cows. In French patent FP2 201 040 there is disclosed the use of Maërl which appears to be in the crude form for animal feeds. Such products as have been available until the present time have tended to be relatively impure products frequently from contaminated sources. Usually they contain significant amounts of siliceous materials derived from the original product as dredged and other non-corallinaceae residues for example ground shells of sea-creatures.

The Institute of Oceanography in Paris produced a report on corallinaceae particularly Lithothamnium in 1989 describing the residual crude product (Maërl) and describing its use in treatment of soil and for animal feed as a dietary supplement and for treatment of water.

Corallinaceae particularly Lithothamnium corallioides are coralline algae. There are a number of sub-species of corallinaceae particularly Lithothamnium differentiated by morphological data but these data can vary depending on local sea bed and weather conditions. Other known "relatives" include Phymatolithon calcareum and in more northerly regions Lithothamnium glaciale. These plants lay down calcium carbonate in their cell walls which gives them a hard stony texture. The living corallinaceae for example Lithothamnium corallioides generally show a red colour due to the presence of a pigment phycoerythrin in their structure. When dead the colour is white or yellowish. Corallinaceae for example Lithothamnium corallioides occurs naturally in cold and temperate seas and has been reported in Norway, Canada, Scotland, Ireland and France.

Since compositions of the subject invention are to be used in foodstuffs it is of course important that the

corallinaceae which is to be exploited in the invention is derived from a part of the world which does not suffer from heavy pollution. For this purpose corallinaceae particularly *Lithothamnium corallioides* harvested from stocks north of Lonehort Point, Castletownbere, County Cork in the Republic of Ireland have proved very satisfactory but there are also deposits off the West Coast of Galway.

10 Naturally occurring residues of *Lithothamnium corallioides* were harvested at the above site at Lonehort Point, purified and concentrated.

15 The raw material can be purified by initial extensive washing with sea and fresh water together with removal of extraneous sand, shells, and other debris particularly siliceous debris such as stones. This step usually reduces the material obtained by dredging from the sea bed to about 20% by weight.

20 The cleaned and separated product is then subjected to intensive cleaning by for example, bleaching and sterilising in hydrogen peroxide for from 8 to 24 hours, further washing in water, drying in a sterile fluid bed and final milling under bacterial controlled conditions.

The stringent washing conditions reduce sodium content of the raw product from amounts in the order of well in excess of 1,000 ppm for example amounts up to 30 5,200 ppm to sodium contents in the low hundreds, for example 300 ppm. Thus there is a reduction of about 10 fold in the sodium content as compared to raw material.

35 The silica content of this final material is normally not more than 0.5% by weight as compared to a silica content in previously available Maërl from a commercial source, of about 5% by weight.

A representative sample of this purified, concentrate contained the following elements in the following amounts

5	Calcium	34%
	Magnesium	2.4%
	Phosphorous	0.08%
	Potassium	0.10%
	Sulphur	0.45%
10	Iron	20 ppm
	Boron	16.5 ppm
	Sodium	300 ppm
	Manganese	125 ppm
	Cobalt	6 ppm
15	Copper	10 ppm
	Zinc	37 ppm
	Selenium	1 ppm
	Molybdenum	<3 ppm
	Iodine	160 ppm
20	Arsenic	<1 ppm
	Lead	<1 ppm
	Chromium	13 ppm
	Cadmium	0.2 ppm
	Mercury	<50 ppb
25	Aluminium	<1 ppm

According to the present invention there is provided a starch based foodstuff which contains a sufficient proportion of the calcareous material as defined above derived from corallinaceae to provide a substantial proportion of the Recommended Dietary Intake of calcium in the daily diet. The foodstuff in question is primarily intended for human beings although the invention could be applied to foodstuffs for animals.

35

Particular foodstuffs are those derived from farinaceous materials i.e. those based primarily on wheat or similar farinaceous grains. Particular products in which the calcareous material can be employed include bread, so-called biscuits or wafers and the various forms of pasta including noodles.

40

Particularly in relation to pasta and as discussed in an article by J Smewing on the Texture of Pasta in

5. Pasta + 1.07% Calcium Carbonate control (70% R.D.I./150g serving).

[R.D.I. - Recommended Dietary Intake]

5

100g of pasta was then cooked in 500ml of water for four minutes, the pasta was then analysed for firmness and stickiness using a texture analyser (AACC 16-50 standard method).

10

Results:

Sample	Firmness (Force g)	Stickiness (Force g)
Batch one	333.022	-1019.63
Batch two	377.902	-1019.927

15

Batch three	300.144	-1018.654
Batch four	310.046	-1018.367
Batch five	291.144	-1017.703

20

The control batch and batch two (40% R.D.I.) were made and analysed on the same day. The test results showed that addition of Calcareous Product increased the firmness of the pasta and reduced the stickiness when compared to the control.

25

At a higher level of Calcareous Product addition, additional water was added (5ml/1 Kg pasta) to prevent the pasta becoming too firm. Therefore a direct comparison cannot be made between batches 1,2 and 3,4,5.

30

Batch five was significantly stickier than any of the other batches of pasta. This was evident in

handling the pasta as strands tended to stick together. This did not happen to the other batches.

5 The organoleptic qualities - colour, volume, speckledness, glossiness and bulkiness - of each batch of pasta were similar and it was impossible to detect any differences in taste between the batches.

10 The fortification of fresh pasta with a Calcareous Product as employed in this invention was very successful, increasing the strength of the pasta and reducing the stickiness.

Example 2

15 Fortification of biscuits with Calcium

Four batches of biscuits were made using the following recipe:

20	400g	Confectionery Flour
	166.8g	Fat
	140g	Sugar
	20g	Syrup
	2.8g	Salt
25	2.0g	Ammonium Bicarbonate
	2.0g	SSL (Sodium Stearoyl Lactylate)
	73g	Water

1. Batch one: Control - no added Calcium.
- 30 2. 1.8% Calcareous Product.
3. 2.0% Coated Calcareous Product) 40% Calcium
R.D.I. per
serving*
4. Calcium Carbonate Control.

35

* one serving of biscuits is three biscuits (20g in weight each).

The biscuits were cooked for exactly eleven minutes and then analysed.

The following parameters were examined: friability,
5 water activity (Aw) and colour.

Sample	Friability	Aw
Batch one	3483.41	0.306
Batch two	4275.13	0.353
Batch three	3406.77	0.335
Batch four	1333.66	0.520

15 Colour was measured using LAB values.

L. Brightness

A. Red

B. Yellow

Sample	L value	A value	B value
Batch one	60.64	10.52	33.78
Batch two	63.66	9.42	31.77
Batch three	63.63	9.60	31.83
Batch four	72.87	3.33	33.18

Friability

The results showed that addition of Calcareous Product
30 increased the friability of the biscuit when compared
with the control (3483.4-4275.1) and addition of coated
Calcareous Product decreased the friability of the

biscuit. However these differences could not be detected by a taste panel. The friability of the biscuits fortified with Calcium Carbonate were significantly reduced and this was very obvious to the
5 taste panel who felt the biscuits tasted soft/gone off.

Water Activity

The water activity of the biscuits fortified with Calcium Carbonate was significantly increased when
10 compared with the control. Addition of either Calcareous Product or coated Calcareous Product did not have a significant effect on the water activity of the biscuits.

15 Colour

The LAB values of the biscuits were measured using a Minolta colour meter.

The lightness of the biscuits fortified with Calcareous
20 Product and coated Calcareous Product were marginally increased, whereas the biscuits fortified with Calcium carbonate increased from 60.64-72.87.

The red colour of the biscuits fortified with Calcium
25 Carbonate was significantly reduced when compared with the control, Calcareous Product and coated Calcareous Product had little effect on this parameter.

The yellow colour of the biscuits was marginally reduced
30 in both the biscuits with additional Calcareous Product, Calcium carbonate did not effect this value.

The taste panel were in agreement that there was very little difference in the appearance and taste of the
35 biscuits fortified with Calcareous Product and coated Calcareous Product when compared with the control. Most people were unable to identify which biscuits had the

additional Calcium. However the biscuits fortified with Calcium Carbonate were pale in colour, soft and unpalatable to taste (loss of sweet flavour).